

UNPUBLISHED PRELIMINARY DATA

5p.

The Geomagnetic Field Variation with Solar Activity at Tucson

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While carrying out some geomagnetic investigations, it was

noted that a simple analysis of the Tucson observatory magnetic records showed the 11-year variation with the sunspot cycle much more clearly than low and mid latitude stations. The horizontal component of the earth's magnetic field undergoes a variation which is generally associated with the variation of the sunspot cycle [see Chapman and Bartels, 1940; Wasserfall, 1941; Vestine, et. al., 1947; Bernard, 1952]. During years of high sunspot activity, the annual mean in H is found to be lower than during years of low sunspot activity although the variation in sunspot numbers during a year may not have affected a corresponding change in H during that year.

Analyses are reported here of annual means of magnetic field data for International quiet days at 3 stations in the American zone, namely, Fredericksburg, Tucson, and Honolulu. The secular variation in the horizontal, vertical, and total field was eliminated by taking the 11-year moving averages in each case and subtracting that from its corresponding annual mean. Thus ΔH , ΔZ , and ΔF were obtained and were plotted against the year in each case for the above stations.

Figure 1 shows the graphs for Fredericksburg, Honolulu, and

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Tucson corresponding to geomagnetic latitudes 50° , 21° , and 40° respectively. The bottom curve shows the variation of sunspot cycle during the period under investigation. It can be seen that only Tucson shows a clear periodic variation with sunspot cycle, with the minimum field occurring about 1-2 years after the sunspot peak. The field variations at Fredericksburg or Honolulu do not show any regularity with sunspot cycle though ΔH at Honolulu exhibits some periodicity. It is interesting to note that ΔH and ΔZ at Honolulu go opposite in phase. We have made similar analyses for San Juan also and there too we do not find any clear cyclic variation with solar activity. Of these 4 stations, therefore, only Tucson shows by simple analysis the characteristic worldwide variation with sunspot cycle.

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FIGURE CAPTION

Figure 1 shows the plot of H (---), Z (o-o), and F (—), in γ at three American stations, Fredericksburg, Honolulu, and Tucson. The geomagnetic latitude of the station is indicated in the parentheses. The bottom curve is a plot of annual mean of relative Zurich sunspot numbers.

